2016 Progress Update Schedule

- E&O Workshop Consultant presents Part 2 info.
- E&O Consultant presents preliminary results of Economic Analysis
- E&O Workshop Consultant presents Part 3 info.
- E&O Staff/ESC recommend Go/No-Go to Phase 3 Study work for Board Consideration

Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec

- HPSC Consultant provides update on work progress
- E&O Consultant presents preliminary results of Economic Analysis
- HPSC Consultant provides update on work progress
- E&O HESC Update
- E&O HESC provides update on work progress
- E&O ESC provides update on work progress
- E&O Meeting Consultant presents Part 1 info.
- HESC Consultant presents initial progress to date
- E&O HPSC provides update on work progress
- HESC Consultant presents update on work progress
- HPSC Consultant provides update on work progress
- ESC Consultant presents results of Economic, Marketability, & Risk Analysis
- E&O HPSC provides update on work progress
- ESC Consultant presents results of Biz Model(s) Analysis

GO or STOP
Presentation of Phase 2 Work Results

Part 1 (Aug 25)
Foundational Information
Project description and study purpose, methodology for assessing project value, and potential risks and mitigation

Part 2 (Today)
Total Project Cost and Benefit
Types of business models, total project cost and revenues, and potential partners

Part 3 (Nov 10)
Investment and Revenues
WA/City investment and revenues by business model
Part 2 Agenda

1. What business models could work?
2. What project costs and revenues can the City and Water Authority expect?
3. Who are the potential partners and what do they think?
4. What are the next steps?
1. What business models could work?
Key Factors in Determining Business Models

1. Mitigate Power Market Risk
   - Engage in Project as a Standalone Entity
   - Allocate Power Market Risk to an Experienced Partner
   - Be the Low Cost Producer
     - Maximize tax-exempt financing
     - Accelerated Depreciation for Partner

2. Respect Municipal Preference Restrictions

3. Observe Power industry model types
Consideration of Project Components

**LAND ASSETS**
- Lands and land rights necessary for development, construction and operation of the Generation and Transmission Assets

**WATER ASSETS**
- Water existing in or supplied to the lower and upper reservoirs necessary for operation of the Generation and Transmission Assets

**CIVIL ASSETS**
- Upper reservoir, penstock/tunnel(s), tailrace, and structures excluding the Generation and Transmission Assets

**GENERATION AND TRANSMISSION ASSETS**
- The powerhouse and related grid interconnection and upgrade facilities
Potential Business Model Structures

**Lease**
- Lease land to third party
- Lease water to third party

**Partnership**
- WA/City develop project in partnership
- Roles of each partner defined

**Self**
- WA/City build, own, and operate

Lowest risk & reward

Greatest risk & reward
Partnership Model Considerations

- There are various types of partnership models

- Cost and revenue allocation based on division of roles and responsibilities between WA/City and partner(s)
  - Who is party to the power purchase agreement
  - Who builds the civil components
  - Who builds the generation and transmission components
  - Who owns/operates the civil components
  - Who owns/operates the generation and transmission component

- More detail at November 10 Special E&O Committee workshop
2. What project costs and revenues can the City and Water Authority expect?
Project Scope - Proposed Infrastructure
## Project Configurations

<table>
<thead>
<tr>
<th>Configuration</th>
<th>B1</th>
<th>B2</th>
<th>B3</th>
<th>B4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity (MW)</td>
<td>500</td>
<td>340</td>
<td>500</td>
<td>300</td>
</tr>
<tr>
<td>Storage (Hours)</td>
<td>5.5</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Number of Pump/Turbines</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Transmission Upgrades (miles)</td>
<td>62</td>
<td>62</td>
<td>62</td>
<td>34</td>
</tr>
</tbody>
</table>
Transmission Cost/ Schedule Risk

Transmission network upgrades
- Varies by project size
- Refundable over 5 years with interest by electrical utilities

Upgrades are dotted line
Project Capital Cost Estimate

(500MW/ 5.5Hr)


Annual Cost ($ million)

- Indirect
- Transmission Upgrades
- Direct
- Financing and Interest
- Contingency (25%)
- Cumulative

Transmission upgrade cost payback over 5 years

2017 $8 2018 $17 2019 $25 2020 $41 2021 $461 2022 $938 2023 $1,493 2024 $2,646 2025 $1,854

(500)
Net Present Value Cost and Revenues (500MW/5.5Hr)

<table>
<thead>
<tr>
<th>Business Model Type</th>
<th>Lease</th>
<th>Partnership</th>
<th>Self</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPV Cost (2016$)</td>
<td>Cost to execute lease</td>
<td>$311M to $1.7B</td>
<td>$1.8B</td>
</tr>
<tr>
<td>NPV Revenue (2016$)</td>
<td>Market value</td>
<td>$375M to $1.8B</td>
<td>$2.1B</td>
</tr>
</tbody>
</table>

** Based on 20 years
Questions
3. Who are the potential partners and what do they think?
Who are the potential partners?

- Potential partners must bring needed skills and resources.

Meetings to discuss potential partnership arrangements:
- Developers
- Investors
- Utilities
- CAISO
**What do they think?**

There is serious interest in the project

<table>
<thead>
<tr>
<th>Key</th>
<th>Renewables over-generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Themes</td>
<td></td>
</tr>
<tr>
<td>Load growth</td>
<td></td>
</tr>
<tr>
<td>California storage mandate</td>
<td></td>
</tr>
<tr>
<td>Competing Technology</td>
<td></td>
</tr>
</tbody>
</table>
## Project Benefits and Costs (500MW/5.5Hr)

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Amount</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity Benefit</td>
<td>$1.4B</td>
<td></td>
</tr>
<tr>
<td>Day-Ahead Energy Benefit</td>
<td>$250M</td>
<td></td>
</tr>
<tr>
<td>Real-Time Energy Benefit</td>
<td>$168M</td>
<td></td>
</tr>
<tr>
<td>Up Regulation Benefit</td>
<td>$29M</td>
<td></td>
</tr>
<tr>
<td>Down Regulation Benefit</td>
<td>$41M</td>
<td></td>
</tr>
<tr>
<td>Spinning Reserve Benefit</td>
<td>$33M</td>
<td></td>
</tr>
<tr>
<td>Non-Spinning Reserve Benefit</td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td>Value of Storage Benefit</td>
<td>$1.2B</td>
<td></td>
</tr>
<tr>
<td>Total Benefits</td>
<td>$3.1B</td>
<td></td>
</tr>
<tr>
<td>Capacity Payment</td>
<td>$2.7B</td>
<td></td>
</tr>
<tr>
<td>Variable Operations &amp; Maintenance</td>
<td>$28M</td>
<td></td>
</tr>
<tr>
<td>Starts Payment</td>
<td>$5M</td>
<td></td>
</tr>
<tr>
<td>Share of Ancillary Services Revenues</td>
<td>$51M</td>
<td></td>
</tr>
<tr>
<td>Total Costs</td>
<td>$2.8B</td>
<td></td>
</tr>
</tbody>
</table>

**Based on 20 years**
### Annual Estimated Value of Storage (500MW/ 5.5Hr)

<table>
<thead>
<tr>
<th>Application</th>
<th>Value Estimate (2016 Dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offset to renewable overbuild</td>
<td>Low: $34M</td>
</tr>
<tr>
<td>System reduced costs (accrued to offtaker)</td>
<td>Low: $5M</td>
</tr>
<tr>
<td>Flexibility to adapt to market changes</td>
<td>Low: $5M</td>
</tr>
<tr>
<td><strong>Total Value</strong></td>
<td><strong>Low: $44M</strong></td>
</tr>
</tbody>
</table>
Key Decision Drivers

1. Are the returns and risks acceptable to the City and Water Authority?

2. Does the Project provide value to electric utility?

3. Does the Electric utility need and want the project?

Go/ No-Go Recommendation to Phase 3 Study
Questions
Existing Scope of Work and Budget

- Determine compatibility between San Vicente Energy Storage Facility and Pure Water Project
  - Complete inlet/outlet study
  - Complete water quality analysis

- Federal Energy Regulatory Commission Preliminary Application Document
  - Prepare PAD
  - Conduct resource agency and public outreach

- Owners advisor economic, risk, market outreach, and business model analyses

- Existing budget: $3.7M
Phase 3 Scope of Work

- **Monitor power market to influence and determine potential project value**
  - California Public Utilities Commission rulemaking Legislation
  - Competitive storage technologies and their pricing and reliability

- **Work with California Independent System Operator regarding storage and transmission needs**
  - Prepare/submit interconnection request application
  - Coordinate with CAISO on its study and network upgrade requirements

- **Seek potential partners**
  - Refine business model(s)
  - Solicit potential partners
  - Negotiate agreement terms
Key Negotiation Points

- Allocation of risk and reward amongst the entities
- Internal rate of return
- Value of storage in terms of revenue stream
- Lease value (if applicable)
- Water Authority and City use of project benefits
  - Energy use
    - City of San Diego: 305,000 MWh
    - Water Authority: 279,000 MWh
Phase 3 Scope of Work (If a “Go”)

<table>
<thead>
<tr>
<th>2017</th>
<th>2018</th>
<th>2019 - 2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor/evaluate market/competing storage technologies</td>
<td>$100K to $150K</td>
<td></td>
</tr>
<tr>
<td>Prepare CAISO interconnection request application and coordinate with CAISO on its study</td>
<td>$150K to $200K</td>
<td>$100K to $150K</td>
</tr>
<tr>
<td>Solicit partner(s)</td>
<td>$100K to $150K</td>
<td></td>
</tr>
<tr>
<td>Negotiate partnership agreement</td>
<td></td>
<td>$250K to $350K</td>
</tr>
<tr>
<td>Submit application w/fee &amp; deposit to CAISO</td>
<td>$500K</td>
<td>($250K is refundable)</td>
</tr>
</tbody>
</table>

Provide periodic updates to Energy Subcommittee and E&O Committee and request approvals

Note: Estimates are approximate
## SVESF versus Iowa Hill

<table>
<thead>
<tr>
<th>Item</th>
<th>SVESF</th>
<th>Iowa Hill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Sponsor</td>
<td>City and Water Authority</td>
<td>SMUD</td>
</tr>
<tr>
<td>Location</td>
<td>San Diego County, CA</td>
<td>El Dorado County, CA</td>
</tr>
<tr>
<td>Max. Capacity</td>
<td>500 MW</td>
<td>400 MW</td>
</tr>
<tr>
<td>Storage</td>
<td>8-hours</td>
<td>16-hours</td>
</tr>
<tr>
<td>Existing Infrastructure</td>
<td>Lower Reservoir and transmission line</td>
<td>Lower reservoir</td>
</tr>
<tr>
<td>Interconnection Distance</td>
<td>5-miles</td>
<td>100-miles</td>
</tr>
<tr>
<td>Partnerships</td>
<td>Yes (many interested partners)</td>
<td>No (no interested partners due to load needs)</td>
</tr>
<tr>
<td>Services provided</td>
<td>Energy, capacity, ancillary</td>
<td>Merchant plant</td>
</tr>
<tr>
<td>Estimate</td>
<td>Conservative, robust geotechnical and existing knowledge</td>
<td><strong>Low transmission upgrade and geotechnical estimates</strong></td>
</tr>
<tr>
<td>Item</td>
<td>SVESF</td>
<td>Eagle Mountain</td>
</tr>
<tr>
<td>------------------------------</td>
<td>--------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Project Sponsor</td>
<td>City and Water Authority</td>
<td>Private Developer</td>
</tr>
<tr>
<td>Location</td>
<td>San Diego County, CA</td>
<td>Riverside County, CA</td>
</tr>
<tr>
<td>Max. Capacity</td>
<td>500 MW</td>
<td>1300 MW</td>
</tr>
<tr>
<td>Storage</td>
<td>8-hours</td>
<td>Up to 18-Hours</td>
</tr>
<tr>
<td>Existing Infrastructure</td>
<td>Lower Reservoir and transmission line</td>
<td>Quarries for upper/lower reservoir</td>
</tr>
<tr>
<td>Interconnection Distance</td>
<td>5-miles</td>
<td>17-miles</td>
</tr>
<tr>
<td>Partnerships</td>
<td>Yes (many interested partners)</td>
<td>NextEra</td>
</tr>
<tr>
<td>Services provided</td>
<td>Energy, capacity, ancillary</td>
<td>Energy, capacity, ancillary</td>
</tr>
<tr>
<td>Estimate</td>
<td>Conservative, robust geotechnical and existing knowledge</td>
<td>Relies on well water for initial fill and yearly fills</td>
</tr>
</tbody>
</table>
Remaining Part 1 Feedback Responses

- Will methods to resolve solar over generation work?
  - Can help reduce belly of duck somewhat, however
    - Large energy users have limited flexibility to adjust operations
    - Limits to the ability to influence behavioral changes

- Did the Investor Owned Utility meet their storage mandates?
  - 1,325 megawatts by 2020 CPUC mandate
    - PG&E 580 MW - SCE 580 MW - SDG&E 165 MW
    - Met or on target to meet 2016 targets

- Did the power market analysis for this study consider rainfall and temperature changes and potential grid regionalization? - Yes

- What is the process for forming a joint power authority?
  - Will be presented at November special E&O workshop
Assembly Bill 33 (Quirk)

- AB 33 (Quirk) would require the CPUC to evaluate and analyze the potential for all types of long-duration bulk energy storage for renewables integration.

- AB 33 passed the Senate and Assembly Floors on unanimous votes last week and is pending final action on the Governor’s Desk.

- Administration previously indicated diminishing interest in energy storage targets and not strong interest in pumped hydropower storage.
  - Creates uncertainty regarding Governor’s action on AB 33.
  - Significant outreach being undertaken by supporters within CPUC and Governor’s office to encourage enactment of the bill.
  - Governor must take action by September 30.
4. What are the next steps?
November 10 E&O Committee Workshop
Part 3

- Update market outreach discussions with potential partners
- Define various “Partnership” business model structure subcategories
- Present WA/City share of investment and revenues by business model
- Outline process for developing a joint powers authority
Questions